KRAMER ELECTRONICS LTD.

USER MANUAL

MODELS:

650T
DVI–Coax Transmitter

650R
Coax–DVI Receiver

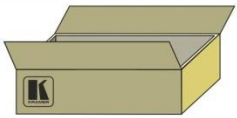
P/N: 2900-000536 Rev 10

650T/650R Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

- **650T** and/or **650R** DVI/Coax Transmitter/Receiver
- 1 Power supply (12V DC)
- 1 Quick Start sheet
- 4 Rubber feet per unit



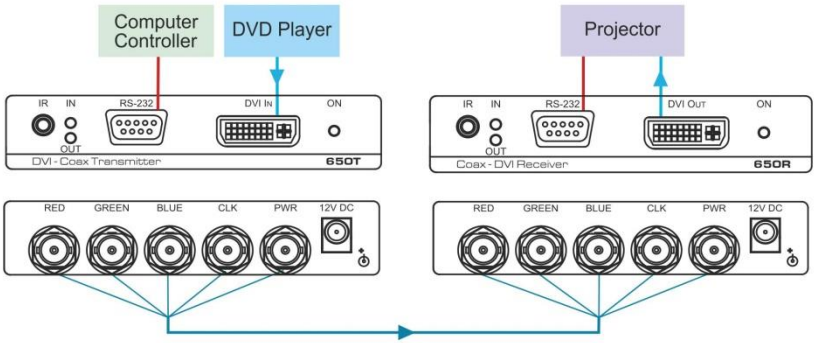
Save the original box and packaging in case your **650T/650R** needs to be returned to the factory for service.

Step 2: Install the 650T/650R

Attach the rubber feet and place on a table or mount the machine in a rack (using an optional **RK-3T** rack mount).

Step 3: Connect the inputs and outputs

Always switch off the power on each device before connecting it to your **650T/650R**.



Always use Kramer high-performance cables for connecting AV equipment to the **650T/650R**.

Step 4: Connect the power

Connect the 12V DC power adapter to the **650T/650R** and plug the adapter into the mains electricity.

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Products.

Thank you for purchasing the Kramer DigiTOOLS® **650T** *DVI-Coax Transmitter* and/or Kramer DigiTOOLS®**650R** *Coax-DVI Receiver*, which are ideal for:

- Boardroom and projection applications
- Long-range multimedia extension for schools, hospitals, security, and stores
- Upgrading a legacy analog installation to a digital installation

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual

Go to http://www.kramerelectronics.com/support/product_downloads.asp to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **650T/650R** away from moisture, excessive sunlight and dust

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

2.2 Safety Instructions

Caution: There are no operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

3 Overview

This section describes the:

- **650T** *DVI-Coax Transmitter*, see Section 3.1
- **650R** *Coax-DVI Receiver*, see Section 3.2

3.1 650T DVI-Coax Transmitter

The Kramer DigiTOOLS® **650T** is an DVI-coax transmitter that receives an DVI signal, codes it, and transmits red, green, blue, clock and data signals, as well as power, infrared and RS-232 control signals over coax cable to the **650R** receiver.

Compatible with a Kramer transmitter and via a Kramer external remote IR receiver: C-A35M/IRR or C-A35M/IRE or C-A35M/2IRE.

The **650T** features:

- A maximum data rate of 6.75Gbps (2.25Gbps per graphic channel) and up to 720P with HDCP
- Digital signal transmission without compression or conversion
- HDTV compatibility and HDCP compliance
- EDID pass-through that passes the EDID between the source and display
- Bi-directional IR (Compatible with a Kramer transmitter and via a Kramer external remote IR receiver: C-A35M/IRR or C-A35M/IRE or C-A35M/2IRE) and RS-232 interfaces

  IR and RS-232 data is available only when using a 5-plug coax cable and the power coax line is connected.
- Power feeding to the **650R**
- Plug and Play installation with no adjustments

3.2 650R Coax-DVI Receiver

The Kramer DigiTOOLS® **650R** is a coax-DVI receiver that receives a coded coax signal transmitted by the **650T**. It decodes the R-G-B, clock and data components and converts them to an DVI output.

The **650R features**:

- A maximum data rate of 6.75Gbps (2.25Gbps per graphic channel) and up to 720P with HDCP
- HDTV compatibility and HDCP compliance
- EDID pass-through that passes the EDID between the source and display
- Bi-directional IR (Compatible with a Kramer transmitter and via a Kramer external remote IR receiver: C-A35M/IRR or C-A35M/IRE or C-A35M/2IRE) and RS-232 interfaces

  IR and RS-232 data is available only when using a 5-plug coax cable and the power coax line is connected.
- Power feeding to the **650T**
- Plug and Play installation with no adjustments

4 Your 650T/650R DVI/Coax Transmitter/Receiver

This section defines the **650T** *DVI-Coax Transmitter* (see Section 4.1) and the **650R** *Coax-DVI Receiver* (see Section 4.2)

4.1 Your 650T DVI-Coax Transmitter

Figure 1 defines the **650T**:

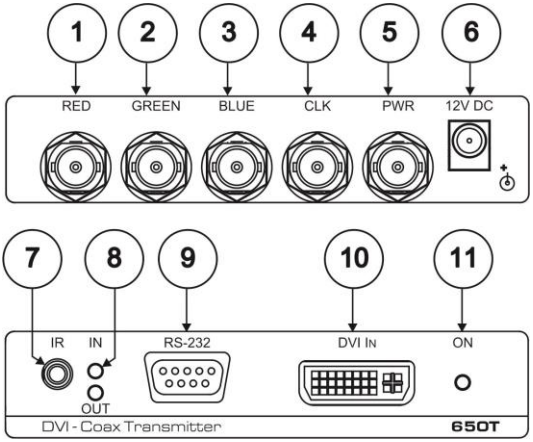

Figure 1: 650T/650R HDMI/Coax Transmitter/Receiver

#	Feature	Function
1	*RED* Output BNC Connector	Transmits the red signal to the **650R**
2	*GREEN* Output BNC Connector	Transmits the green signal to the **650R**
3	*BLUE* Output BNC Connector	Transmits the blue signal to the **650R**
4	*CLK* Output BNC Connector	Transmits the clock signal to the **650R**
5	*PWR* Output BNC Connector	Transmits power and the IR signal to the **650R**
6	*12V DC*	+12V DC connector for powering the unit
7	*IR* Connector	Connects to an IR sensor or transmitter Compatible with a Kramer transmitter and via a Kramer external remote IR receiver: C-A35M/IRR or C-A35M/IRE or C-A35M/2IRE
8	*IN / OUT* LED	The IN LED Illuminates when an input source is connected. The OUT LED illuminates when an output acceptor is connected
9	*RS-232* 9-pin D-sub Connector	Connects to an RS-232 computer source
10	*DVI IN* Connector	Connects to a DVI source
11	*ON* LED	Illuminates when receiving power

4.2 Your 650R Coax-DVI Receiver

Figure 2 defines the **650R**:

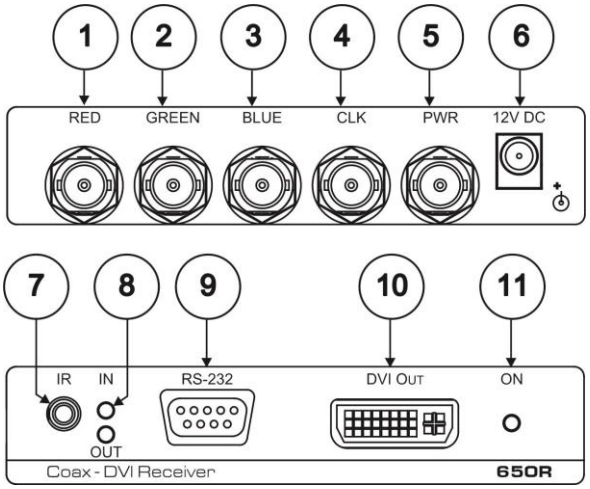

Figure 2: 650R Coax-DVI Receiver

#	Feature	Function
1	*RED* Input BNC Connector	Receives the red signal from the **650T**
2	*GREEN* Input BNC Connector	Receives the green signal from the **650T**
3	*BLUE* Input BNC Connector	Receives the blue signal from the **650T**
4	*CLK* Input BNC Connector	Receives the clock signal from the **650T**
5	*PWR* Input BNC Connector	Receives power and the IR signal from the **650T**
6	*12V DC*	+12V DC connector for powering the unit
7	*IR* Connector	Connects to an IR sensor or transmitter Compatible with a Kramer transmitter and via a Kramer external remote IR receiver: C-A35M/IRR or C-A35M/IRE or C-A35M/2IRE
8	*IN / OUT* LED	The IN LED Illuminates when an input source is connected. The OUT LED illuminates when an output acceptor is connected
9	*RS-232* 9-pin D-sub Connector	Connects to an RS-232 computer source
10	*DVI OUT* Connector	Connects to a DVI acceptor
11	*ON* LED	Illuminates when receiving power

5 Connecting the 650T/650R

You can use the **650T** *DVI-Coax Transmitter* and the **650R** *Coax-DVI Receiver* to configure an DVI-to-Coax Transmitter and Receiver system (see Figure 3).

Always switch off the power to each device before connecting it to your **650T/650R**. After connecting your **650T**/**650R**, connect its power and then switch on the power to each device.

To connect the DVI-to-Coax Transmitter and Receiver system as shown in the example in Figure 3, do the following:

1. Connect an DVI source, for example, the DVI output from a Blu-ray DVD player, to the **650T** DVI IN connector.
2. Connect the **650R** DVI OUT connector to the DVI acceptor, for example, a projector.
3. If using a 4-plug coax cable or 4 coax cables:
   - Connect the **650T** red, green, blue, and clock BNC connectors to the **650R** red, green, blue and, clock BNC connectors
   - Connect 12V DC power supplies to both the **650T** and the **650R** (not shown in Figure 3). The remote power and IR remote control functions are not available
4. If using a 5-plug coax cable or 5 coax cables:
   - Connect the **650T** red, green, blue, clock, and power BNC connectors to the **650R** red, green, blue, clock, and power BNC connectors
   - Connect one 12V DC power supply to either the **650T** or the **650R** (not shown in Figure 3). Power and the IR remote control function are transmitted over the power coax connection to the second device

Note: All coax cables must be the same length. There can be no more than 6 inches (15cm) difference in length between any of the cables.

5. Connect the power supply(s) to the mains electricity.

After all connections are made and the units are powered ON, the system operates.

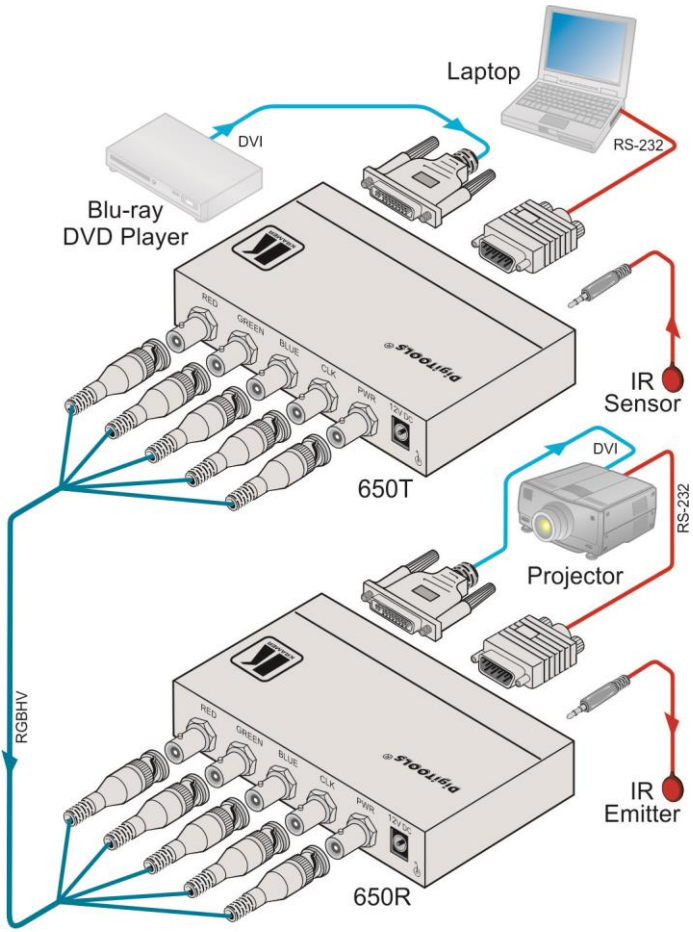

Figure 3: DVI-to-Coax Transmitter and Receiver System

6 Technical Specifications

INPUTS:	1 DVI connector	5 BNC connectors
OUTPUTS:	5 BNC connectors	1 DVI connector
PORT:	IR on a 3.5mm mini jack, RS-232 on a 9-pin D-sub connector	
MAX. DATA RATE:	Supports up to 6.75Gbps (2.25Gbps per graphic channel) and up to 720P with HDCP	
STANDARDS COMPLIANCE:	HDCP	
POWER SOURCE:	12V DC, 270mA (650T) 12V DC 450mA (650T / 650R pair when powered from 650T via Power Connect with 60m cable)	12V DC, 160mA (650R) 12V DC 590mA (650T / 650R pair when powered from 650R via Power Connect with 60m cable)
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)	
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)	
HUMIDITY:	10% to 90%, RHL non-condensing	
DIMENSIONS:	12.0cm x 7.0cm x 2.4cm (4.7" x 2.8" x 1.0"), W, D, H	
WEIGHT:	0.3kg (0.7lbs) approx.	
ACCESSORIES:	Power supply	
OPTIONS:	Kramer external remote IR receiver, C-A35M/IRR or C-A35M/IRE or C-A35M/2IRE	
Specifications are subject to change without notice at http://www.kramerelectronics.com		

650T/650R Range Chart	
Cable Type	**Max Range**
BC-5 (28 AWG)	50m
BC-5 (26 AWG)	60m
RG-59	115m
RG-6	150m

LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics will not do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at www.kramerelectronics.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required. You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

Limitation on Liability

THE MAXIMUM LIABILITY OF KRAMER ELECTRONICS UNDER THIS LIMITED WARRANTY SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID FOR THE PRODUCT. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS IS NOT RESPONSIBLE FOR DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY. Some countries, districts or states do not allow the exclusion or limitation of relief, special, incidental, consequential or indirect damages, or the limitation of liability to specified amounts, so the above limitations or exclusions may not apply to you.

Exclusive Remedy

TO THE MAXIMUM EXTENT PERMITTED BY LAW, THIS LIMITED WARRANTY AND THE REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, EXPRESS OR IMPLIED. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS SPECIFICALLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IF KRAMER ELECTRONICS CANNOT LAWFULLY DISCLAIM OR EXCLUDE IMPLIED WARRANTIES UNDER APPLICABLE LAW, THEN ALL IMPLIED WARRANTIES COVERING THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY TO THIS PRODUCT AS PROVIDED UNDER APPICABLE LAW.

IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS A "CONSUMER PRODUCT" UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. §2301, ET SEQ.) OR OTHER APPICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY AS PROVIDED UNDER APPLICABLE LAW.

Other Conditions

This limited warranty gives you specific legal rights, and you may have other rights which vary from country to country or state to state.

This limited warranty is void if (i) the label bearing the serial number of this product has been removed or defaced, (ii) the product is not distributed by Kramer Electronics or (iii) this product is not purchased from an authorized Kramer Electronics reseller. If you are unsure whether a reseller is an authorized Kramer Electronics reseller, please visit our Web site at www.kramerelectronics.com or contact a Kramer Electronics office from the list at the end of this document.

Your rights under this limited warranty are not diminished if you do not complete and return the product registration form or complete and submit the online product registration form. Kramer Electronics thanks you for purchasing a Kramer Electronics product. We hope it will give you years of satisfaction.

For the latest information on our products and a list of Kramer distributors, visit our Web site where updates to this user manual may be found.

We welcome your questions, comments, and feedback.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com

SAFETY WARNING
Disconnect the unit from the power supply before opening and servicing

P/N: 2900-000536 Rev: 10